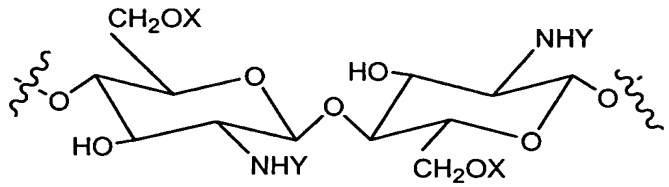
CLAIMS

1. An N-acylated chitinous polymer, wherein said chitinous polymer is comprised of subunits of the formula:



wherein

X is independently selected from hydrogen, $-(CH_2)_bCOG$, or $-(CH_2)_bCOOZ$ for each occurrence, provided that at least 10% of X groups on said polymer are $-(CH_2)_bCOOZ$ or $-(CH_2)_bCOG$;

Y is independently selected from $-C(=O)-R-CO_2Z$, $-C(C=O)-R-COG$, hydrogen, carboxyalkyl, acetyl, or a pharmaceutically acceptable salt thereof for each occurrence, provided that at least 1 % of Y groups on said polymer are $-C(=O)-R-CO_2Z$ or $-C(C=O)-R-COG$;

R is independently selected from the group consisting of alkyl, alkenyl, and aryl;

b is 1-8;

G is an agent or a pharmaceutically acceptable salt thereof; and

Z is hydrogen, a cation, an agent, or a pharmaceutically acceptable salt thereof.

2. The N-acylated chitinous polymer of claim 1, wherein at least 30% of said X groups on said polymer are of the formula $-(CH_2)_bCOOZ$ or $-(CH_2)_bCOG$.

3. The N-acylated chitinous polymer of claim 1, wherein b is 1-5.

4. The N-acylated chitinous polymer of claim 3, wherein b is 1.

5. The N-acylated chitinous polymer of claim 1, wherein at least 10% of said Y groups on said polymer are $-C(=O)-R-CO_2Z$ or $-C(C=O)-R-COG$.

6. The N-acylated chitinous polymer of claim 5, wherein at least 20% of said Y groups on said polymer are $-C(=O)-R-CO_2Z$ or $-C(C=O)-R-COG$.

7. The N-acylated chitinous polymer of claim 1, wherein R is $-(CH_2)_a-$, wherein a is 1-8.

8. The N-acylated chitinous polymer of claim 7, wherein a is 2, 3, or 4.

9. The N-acylated chitinous polymer of claim 1, wherein R is aryl.

10. The N-acylated chitinous polymer of claim 1, wherein R comprises one or more heteroatoms.

11. The N-acylated chitinous polymer of claim 1, wherein said polymer is selected from the group consisting of N,O-carboxymethyl-N-succinylchitosan, N,O-carboxymethyl-N-citraconylchitosan, N,O-carboxymethyl-N-glutarylchitosan, and mixtures thereof.

12. The N-acylated chitinous polymer of claim 1, wherein said polymer is water soluble.

13. The N-acylated chitinous polymer of claim 10, wherein said polymer is water soluble at pH's from about 1 to about 11.

14. The N-acylated chitinous polymer of claim 1, wherein Z is an agent.

15. The N-acylated chitinous polymer of claim 1 or 14, wherein said agent is a therapeutic agent.

16. The N-acylated chitinous polymer of claim 15, wherein said therapeutic agent is an anti-cancer agent.

17. The N-acylated chitinous polymer of claim 15, wherein said therapeutic agent is an agent for the treatment of a central nervous system disorder.

18. The N-acylated chitinous polymer of claim 15, wherein said therapeutic agent is an anti-inflammatory agent.

19. The N-acylated chitinous polymer of claim 13, wherein said therapeutic agent is selected from the group consisting of 5-aminosalicylic acid, doxorubicin, peptides, and mixtures thereof.

20. A method for administering an agent in a subject comprising administering an N-acylated-N,O-carboxyalkylchitosan assoicated with an agent, and allowing said agent to be released in said subject.

21. The method of claim 20, wherein said agent is released in a low pH environment.

22. The method of claim 20, wherein said agent is released in said subject's intestine, stomach, urinary tract, or reproductive tract.

23. The method of claim 20, wherein said N-acylated-N,O-carboxyalkylchitosan is an N-acylated chitinous polymer of claim 1.

24. A method for treating a subject suffering from a disorder comprising administering an effective amount of an N-acylated-N,O-carboxyalkylchitosan associated with a therapeutic agent to treat said disorder.

25. The method of claim 24, wherein said disorder is selected from the group consisting of cancer, nervous system disorder, a urinary tract disorder, gastrointestinal tract disorder, and reproductive tract disorder.

26. The method of claim 24, wherein said therapeutic agent is released in said subject from said N-acylated-N,O-carboxyalkylchitosan.

27. The method of claim 24, wherein said N-acylated-N-O-carboxyalkylchitosan is an N-acylated chitinous polymer of claim 1.

28. A method for treating a subject suffering from a urinary tract disorder comprising administering an effective amount of an N-acylated-N,O-carboxyalkylchitosan associated with a therapeutic agent to treat said urinary tract disorder.

29. The method of claim 28, wherein said urinary tract disorder is a bladder infection.

30. The method of claim 29, wherein said bladder infection is interstitial cystitis.

31. The method of claim 19, wherein said therapeutic agent is an antibiotic or anti-inflammatory agent.

32. A method for treating a subject suffering from reproductive tract disorder comprising administering an effective amount of an N-acylated-N,O-carboxyalkylchitosan associated with a therapeutic agent to treat said reproductive tract disorder.

33. The method of claim 32, wherein said reproductive tract disorder is a disorder of the female reproductive tract.

34. The method of claim 32, wherein said reproductive tract disorder is a disorder of said subject's vagina or uterus.

35. The method of claim 32, wherein said agent is an antibiotic or an anti inflammatory agent.

36. The method of claim 33, wherein said reproductive tract disorder is infertility, a uterine fibroid, a pelvic mass, or endometriosis.

37. A method for treating a subject suffering from cancer comprising administering an effective amount of an N-acylated-N,O-carboxyalkylchitosan associated with an anti-cancer agent to treat said cancer.

38. The method of claim 37, wherein said cancer is bladder cancer.

39. The method of claim 38, wherein said anti-cancer agent is selected from the group consisting of BCG, α-interferon, valrubicin, mytomicin, and combinations thereof.

40. A method for treating a subject suffering from a nervous system disorder comprising administering an effective amount of an N-acylated-N,O-carboxyalkylchitosan associated with a therapeutic agent to treat said nervous system disorder.

41. A method for preventing surgical adhesion in a subject, comprising administering to a subject an effective amount of an N-acylated-N,O-carboxyalkylchitosan, to prevent surgical adhesion in said subject.

42. A cross linked N-acylated-N,O-carboxyalkylchitosan.

43. The cross linked N-acylated-N,O-carboxyalkylchitosan of claim 42, wherein said chitosan is cross linked with divinyl sulfone.

44. The cross linked N-acylated-N,O-carboxyalkylchitosan of claim 42, wherein said cross linked chitosan forms a hydrogel in water.

45. A pharmaceutical composition, comprising the cross linked N-acylated-N,O-carboxyalkylchitosan of claim 42 and a pharmaceutically acceptable carrier.

46. The pharmaceutical composition of claim 45, wherein said composition further comprises a therapeutic agent.

47. A pharmaceutical composition comprising the N-acylated chitinous polymer of claim 1 and a pharmaceutically acceptable carrier.

48. The pharmaceutical composition of claim 47, wherein said composition further comprises a therapeutic agent.

49. The pharmaceutical composition of claim 48, wherein said therapeutic agent is dispersed within said N-acylated chitinous polymer.

50. The pharmaceutical composition of claim 47, wherein said N-acylated-N,O-carboxyalkylchitosan is formulated as microcapsules, nanocapsules, a gel, polymer, thin film, or a mixture thereof.